Investigating the Origins of Hot Neptunes From Radial Velocity Data

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Hot Neptunes are extrasolar planets that are similar in size to Neptune in our solar system but are much closer to their host stars, completing an orbit in 10 days or less. The origin of hot Neptunes is not fully understood. A potential large third body at a distance can lead to the migration of long-period planets to become much closer to the host star, and this Lidov-Kozai mechanism helps explain the origin of hot Jupiters. I investigate whether hot Neptunes could share a similar origin by analyzing radial velocity data from multiple sources for a sample of 34 hot Neptune systems. I compare the distribution of the inferred linear trends in the radial velocity data with that of the hot Jupiters. In general, hot Neptune systems have somewhat lower values of linear trend. My comparisons suggest that single-planet hot Neptune systems are more likely to share the same origin as hot Jupiters, e.g., through the gravitational effect of large third bodies. For multi-planet hot Neptune systems, the other planets may have an effect on the Neptune's migration to a smaller orbit.

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